

CLAIMS

We claim:

1 1. A method for browsing information on a display device of a hand-held
2 device, wherein the method comprises a virtual display being the display device of the hand-held
3 device, a viewpoint from which the virtual display is viewed and a virtual data object comprising
4 information to be viewed on the virtual display, wherein the method comprises the steps of:

5 coupling the display device to a digital processor;

6 mapping information content generated by the digital processor into the virtual
7 data object suitable for conveying information to the user of the hand-held device;

8 displaying a portion of the virtual data object at a time on the display device, the
9 virtual data object comprising characters, pictures, lines, links, video or pixels that can be
10 conveniently displayed on the display device at a time;

11 wherein information is browsed on the display device essentially in a mirror-like
12 way, the method further comprising the step of:

13 moving the portion of the virtual data object displayed on the display device in the
14 same direction as the hand-held device is tilted, whereby a certain orientation of the hand-held
15 device always displays the same portion of the virtual data object on the display device.

1 2. The method according to claim 1, wherein the method comprises the steps of:

2 setting a predefined xy-plane as a xy-plane;

3 determining a relation between the rotation degree around the x-axis and the y-
4 axis and the amount of the displacement of the portion on the virtual data object displayed on the
5 display device at a time;

6 displacing the position of the displayed portion of the virtual data object to the
7 right when the hand-held device is rotated essentially towards the positive rotation direction
8 around the y-axis;

9 displacing the position of the displayed portion of the virtual data object to the left
10 when the hand-held device is rotated essentially towards the negative rotation direction around
11 the y-axis;

12 displacing the position of the displayed portion of the virtual data object upwards
13 when the hand-held device is rotated essentially towards the positive rotation direction around
14 the x-axis;

15 displacing the position of the displayed portion of the virtual data object
16 downwards when the hand-held device is rotated essentially towards the negative rotation
17 direction around the x-axis; and

18 displaying the movement of the portion of the virtual data object on the display
19 device of the hand-held device according to the set relation.

1 3. The method according to claim 2, wherein the method comprises the step of:

2 changing the relation between the rotation degree around the x-axis and/or the y-
3 axis and the amount of the displacement of the portion on the virtual data object in proportion to
4 the distance between the viewpoint and the display device.

1 4. The method according to claim 1, wherein the movement of the portion of the
2 virtual data object displayed on the display device is proportional to the change amount and/or
3 rate of the rotational movement around the x-axis and/or y-axis.

1 5. The method according to claim 1, wherein the method comprises the steps of:
2 setting the display device into a zoom mode;
3 determining the distance between the viewpoint and the display device; and
4 zooming in or out the displayed information based on the determined distance
5 information.

1 6. The method according to claim 1, wherein the method comprises the steps of:
2 setting the display device into a zoom mode; and
3 zooming in or out the displayed information when rotating the hand-held device
4 around the axis being essentially perpendicular to the predefined xy-plane.

1 7. The method according to claim 1, wherein the method comprises the steps of:
2 setting the display device into a zoom mode; and
3 zooming in or out the displayed information when the hand-held device is tilted.

1 8. The method according to claim 1, wherein the information displayed on the
2 display device essentially depends on the location and orientation of the virtual display, the
3 viewpoint and the virtual data object.

1 9. The method according to claim 1, wherein the method comprises the steps of:
2 setting the display device surface level as an xy-plane;
3 determining a relation between the x-axial and/or y-axial movement of the hand-
4 held device and the amount of the displacement of the portion of the virtual data object displayed
5 on the display device at a time; and

6 moving the portion of the virtual data object displayed on the display device in the
7 same direction as the hand-held device is moved in the xy-plane according to the relation
8 information.

1 10. The method according to claim 1, wherein filtering the x-axial, y-axial and/or
2 tilting movements before displaying the movements on the display device.

1 11. The method according to claim 1, wherein changing the relation between the
2 rotation degree around the x-axis and y-axis and the amount of the displacement of the portion of
3 the virtual data object displayed on the display device at a time.

1 12. The method according to claim 1, wherein the method comprises the step of:
2 keeping the orientation of the information displayed on the display device
3 unchanged when rotating the hand-held device around the axis being essentially perpendicular to
4 the surface level of the hand-held device.

1 13. A hand-held device for browsing information,
2 wherein the hand-held device comprises a virtual display being the display device
3 of the hand-held device, the hand-held device comprising:
4 a digital processor (30);
5 a memory (60,70) coupled to the digital processor (30), the memory (60,70)
6 comprising a virtual data object suitable for conveying information to the user of the hand-held
7 device;
8 a display device (10) coupled to the digital processor (30);

means (30) for moving the portion of the virtual data object displayed on the display device in the same direction as the hand-held device is tilted, whereby a certain orientation of the hand-held device always displays the same portion of the virtual data object on the display device.

14. The hand-held device according to claim 13, wherein the hand-held device comprises:

means (30) for setting an xy-plane as a default xy-plane;

relation information (60) based on the rotation degree around the x-axis and y-axis and the amount of the displacement of the portion of the virtual display space displayed on the display device at a time;

means (30) for determining the rotation amount around the x-axis and/or y-axis;

and

means (30) for changing the location of the portion of the virtual data object displayed on the display device (10) based on the rotational amount around the x-axis and/or y-axis and the relation information (REL).

15. The hand-held device according to claim 13, wherein the hand-held device comprises means (30) for changing the relation information (60).

16. The hand-held device according to claim 13, wherein the hand-held device comprises:

means (30) for setting the display device into a zoom mode;

means (20,50) for determining the distance between the viewpoint and the display device; and

means (30) for zooming in or out the displayed information based on the distance information.

17. The hand-held device according to claim 13, wherein the hand-held device comprises means (30) for zooming in or out the displayed information when rotating the hand-held device around the axis being essentially perpendicular to the predefined xy-plane.

18. The hand-held device according to claim 13, wherein the hand-held device comprises:

means (30) for setting the display device surface level as an xy-plane;

relation information (60) between the x-axial and/or y-axial movement of the hand-held device and the amount of the displacement of the portion of the virtual data object displayed on the display device at a time;

means (30) for determining the amount of displacement in the xy-plane; and

means (30) for moving the portion of the virtual data object displayed on the display device (10) in the same direction as the hand-held device is moved in the xy-plane according to the relation information (60).

19. The hand-held device according to claim 13, wherein the hand-held device comprises means (30) for filtering the x-axial, y-axial and/or tilting movements before displaying the movements on the display device (10).

1 20. The hand-held device according to claim 13, wherein the hand-held device
2 comprises means (30) for changing the relation (60) between the rotation degree around the x-
3 axis and y-axis and the amount of the displacement of the portion of the virtual data object
4 displayed on the display device (10) at a time.

1 21. The hand-held device according to claim 13, wherein the hand-held device
2 comprises means (30) for changing the relation (60) between the x-axial and/or y-axial
3 movement of the hand-held device and the amount of the displacement of the portion of the
4 virtual data object displayed on the display device at a time.

1 22. A computer program embodied on a computer-readable medium, wherein the
2 computer program executes the program steps recorded in a computer-readable medium to
3 perform a method for browsing information on a display device of a hand-held device, wherein
4 the method comprises a virtual display being the display device of the hand-held device, a
5 viewpoint from which the virtual display is viewed and a virtual data object comprising
6 information to be viewed on the virtual display, wherein the method comprises the steps of:

7 coupling the display device to a digital processor;

8 mapping information content generated by the digital processor into the virtual
9 data object suitable for conveying information to the user of the hand-held device;

10 displaying a portion of the virtual data object at a time on the display device, the
11 virtual data object comprising characters, pictures, lines, links, video or pixels that can be
12 conveniently displayed on the display device at a time;

13 wherein in the method information is browsed on the display device essentially in a
14 mirror-like way, the method further comprising the step of:

15 moving the portion of the virtual data object displayed on the display device in the same
16 direction as the hand-held device is tilted, whereby a certain orientation of the hand-held device
17 always displays the same portion of the virtual data object on the display device.

1 23. The computer program according to claim 22, wherein the computer program
2 executes the steps of:

3 setting a predefined xy-plane as a xy-plane;

4 determining a relation between the rotation degree around the x-axis and the y-
5 axis and the amount of the displacement of the portion on the virtual data object displayed on the
6 display device at a time;

7 displacing the position of the displayed portion of the virtual data object to the
8 right when the hand-held device is rotated essentially towards the positive rotation direction
9 around the y-axis;

10 displacing the position of the displayed portion of the virtual data object to the left
11 when the hand-held device is rotated essentially towards the negative rotation direction around
12 the y-axis;

13 displacing the position of the displayed portion of the virtual data object upwards
14 when the hand-held device is rotated essentially towards the positive rotation direction around
15 the x-axis;

16 displacing the position of the displayed portion of the virtual data object
17 downwards when the hand-held device is rotated essentially towards the negative rotation
18 direction around the x-axis; and
19 displaying the movement of the portion of the virtual data object on the display
20 device of the hand-held device according to the set relation.

1 24. The computer program according to claim 22, wherein the computer program
2 executes the step of:

3 changing the relation between the rotation degree around the x-axis and/or the y-
4 axis and the amount of the displacement of the portion on the virtual data object in proportion to
5 the distance between the viewpoint and the display device.

1 25. The computer program according to claim 22, wherein the movement of the
2 portion of the virtual data object displayed on the display device is proportional to the change
3 amount and/or rate of the rotational movement around the x-axis and/or y-axis.

1 26. The computer program according to claim 22, wherein the computer program
2 executes the steps of:

3 setting the display device into a zoom mode;
4 determining the distance between the user of the hand-held device to the display
5 device; and
6 zooming in or out the displayed information based on the determined distance
7 information.

1 27. The computer program according to claim 22, wherein the computer program
2 executes the steps of:

3 setting the display device into a zoom mode; and
4 zooming in or out the displayed information when rotating the hand-held device
5 around the axis being essentially perpendicular to the surface level of the hand-held device.

1 28. The computer program according to claim 22, wherein the computer program
2 executes the steps of:

3 setting the display device into a zoom mode; and
4 zooming in or out the displayed information when the hand-held device is tilted.

1 29. The computer program according to claim 22, wherein the information displayed
2 on the display device essentially depends on the location and orientation of the virtual display,
3 the viewpoint and the virtual data object.

1 30. The computer program according to claim 22, wherein the computer program
2 executes the steps of:

3 setting the display device surface level as an xy-plane;
4 determining a relation between the x-axial and/or y-axial movement of the hand-
5 held device and the amount of the displacement of the portion of the virtual data object displayed
6 on the display device at a time; and
7 moving the portion of the virtual data object displayed on the display device in the
8 same direction as the hand-held device is moved in the xy-plane according to the relation
9 information.

1 31. The computer program according to claim 22, wherein filtering the x-axial, y-
2 axial and/or tilting movements before displaying the movements on the display device.

1 32. The computer program according to claim 22, wherein changing the relation
2 between the rotation degree around the x-axis and y-axis and the amount of the displacement of
3 the portion of the virtual data object displayed on the display device at a time.

1 33. The computer program according to claim 22, wherein the computer program
2 executes the step of:

3 keeping the orientation of the information displayed on the display device
4 unchanged when rotating the hand-held device around the axis being essentially perpendicular to
5 the surface level of the hand-held device.